TURKLE - CLARK ENVIRONMENTAL CONSULTING, L.C.

Con 12-1-1
Doc # 65305

May 26, 2011

Mick Leat
IDNR Land Quality
5th Floor, Wallace Bldg
502 E. 9th St
Des Moines, IA 50319

PLANS AND SPECIFICATIONS
APPURTENANT TO
PERMIT FOR SANITARY DISPOSAL PROJECT
NO 25-SDP-01-75
DATED May 20, 2010
IOWA DEPARTMENT OF
NATURAL RESOURCES
ENVIRONMENTAL SERVICES DIVISION
By

RE: South Dallas County Landfill - #25-SDP-01-75
TDA Specification

Dear Mick,

Enclosed is the Specification for the Use of Tire Derived Aggregate as Leachate Drainage Material that will be used during Phase 3 construction at the South Dallas County Landfill. The TDA in the 5-gallon sample shown to you at a previous meeting were counted and the protruding wires measured. Copies of the raw data are also enclosed as are various pictures taken during the measuring process. The results are summarized in the Specification report and were used to determine the limits for the TDA that will be used as the Phase 3 drainage media.

Also provided is a copy of the field report that will be used during the inspection of the delivered TDA loads. These field reports will be included with the QCA report after completion of the Phase 3 construction.

If you have questions regarding this information, please contact me directly at 515-961-7864.

Respectfully submitted,

Cindy Turkle
Senior Environmental Professional

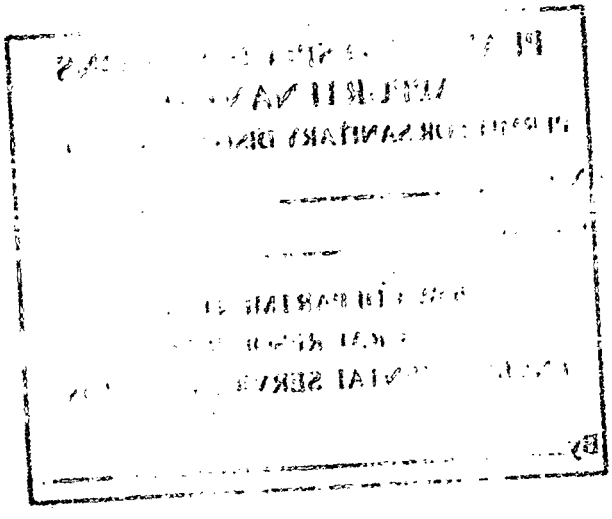
SDP AMENDMENT # 3
Date: Jun 2, 2011

Cc Vickie Moorhead/Shirley McAdon
HLW Engineering Group

Enclosures

46221 AM11:20 05/31/11

12662 McKinley Trail Indianola, Iowa 50125 (515) 961-7864 FAX (515) 961-2981



SDP AMENDMENT #_____

Date: _____

SPECIFICATION FOR THE USE OF TIRE DERIVED AGGREGATE AS LEACHATE DRAINAGE MATERIAL For the South Dallas County Landfill Agency Phase 3 Construction

2011

Background

The South Dallas County Landfill Agency proposed the use of Tire Derived Aggregate (TDA) as leachate drainage material as part of the Phase 3 construction documents. TDA has been used by other landfills with clay-only liners and with FML/clay composite liners. New internal requirements of the Iowa Dept. of Natural Resources (IDNR) resulted in IDNR staff requesting additional testing of the TDA prior to approving its use at the South Dallas County Landfill.

These additional tests included the collection of a super sack of TDA from Liberty Tire in Des Moines and its shipment to JLT Laboratories in Pennsylvania for stress column and permeability testing. For the stress column testing, five 5-gallon buckets of the clay soil to be used for the liner was also sent to this lab. While collecting TDA from Liberty Tire, two 5-gallon buckets of TDA were representatively collected from the same stockpile as those used by JLT Laboratories in the stress column test.

IDNR staff requested a specification for comparing the TDA used in the lab testing to those that will be delivered for actual use at the Phase 3 construction site. At the IDNR's request, one 5-gallon bucket of the collected TDA was counted, the wire in every chip classified as either belt wire or bead wire, and the length of the longest wire in piece measured. The raw data and the summary results are enclosed.

Summary of Analysis

A total of 818 pieces of TDA components were counted and measured in the 5-gallon bucket. The TDA pieces were classified as those with belt wire, belt wire clumps (just clumps of belt wire without significant rubber), TDA with bead wire, and individual pieces of bead wire without rubber attached. Photos were taken and are enclosed.

A breakdown of the TDA in the representative 5-gallon sample is summarized in Table 1. The results indicate 86.4% of the TDA were classified as chips with belt wire only. An additional 10.4% was belt wire clumps without significant rubber. Only 2.1% of the TDA had bead wire in them and of that none exceeded one inch in length. Of the TDA with bead wire, only 18% had bead wire that exceeded ½ inch in length. Individual pieces of bead wire without rubber were measured and counted but accounted for only 1.1% of the total. Individual strands of belt wire and small tire particles without wire and that were less than ½ inch in diameter, were not measured or counted and were considered insignificant ("tire dust").

Based upon observations and experiments with the various pieces, it was impossible to get any individual tire piece to stand on its edge, whether it had belt wire or bead wire. In addition, the individual bead wire pieces always tended to fall flat even when placed with the other chips.

Table 1 – Analysis Summary of Representative Tire Derived Aggregate Sample

Classification	Number of Pieces	Percentage of Total Sample	Length of wire (inches)	Percentage By Wire Length
TDA with Belt Wire	707	86.4%	0 - 0.5	68%
			0.5 – 1.5	28%
			1.5 – 3.4	4%
Belt Wire Clumps without Significant Rubber	85	10.4%	0 - 0.5	0%
			0.5 – 1.5	44%
			1.5 – 3.0	53%
			3.0 – 4.1	3%
TDA with Bead Wire	17	2.1%	0 - 0.2	41%
			0.2 – 0.5	41%
			0.5 – 1.0	18%
Individual Pieces of Bead Wire without Rubber	9	1.1%	0 – 1.0	33.3%
			1.0 – 2.0	33.3%
			2.0 – 3.0	33.3%

Recommendations

Due to the IDNR requirements, the Phase 3 liner will consist of two-feet of clay soil, a flexible membrane liner (FML) consisting of 60 mil high density polyethylene (HDPE) and a 32 ounce/sq. yd geotextile cushion layer. The leachate drainage material will be 2-inch nominal TDA. The JLT Lab testing was conducted on a 16 oz/sq. yd. geotextile cushion layer and results indicated no damage to the underlining FML. The thickness of the geotextile tested (16 oz/sq. yd.) is approximately 0.17 inch. With the requirement to use a 32 oz/sq. yd. geotextile, even more protection will be achieved. The actual thicknesses of the materials that will be used in the liner are approximately 0.06 inch for the FML and approximately 0.33 inch for the geotextile for a total of approximately 0.39 inches (slightly over 3/8 inch).

Based upon the sample analysis, 0.4% of the sample consisted of TDA with bead wire exceeding 0.5 or ½ inch in length protruding from the TDA.

Field QCA Procedures

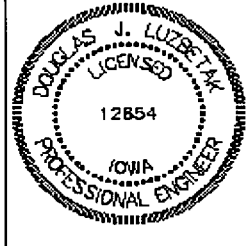
During the receipt of TDA to be used for the Phase 3 leachate drainage material, the second 5-gallon bucket of TDA collected with the sample sent to the testing laboratory will be used as a visual comparison. The on-site QCA representative will visually view the loads and make note of any observations. If the load appears to exceed the specifications for bead wire or does not appear similar to the representative 5-gallon bucket, the load will be refused.

In addition, one gallon of representative TDA will be collected initially from every 100 ton of TDA received. The TDA in the representative sample will be sorted and examined for bead wire. Should the bead wire with rubber exceed the specification limits, it will be refused and sent back to the tire processor or used on-site for other purposes (e.g ADC, gas vent TDA). TDA not meeting the specifications **will not** be used in the Phase 3 cell as leachate drainage material.

The TDA in each collected one-gallon sample will be counted, but only the TDA with bead wire will be measured. If after five samples have been collected and measured, and the results of all five are found to meet the specifications, then the sampling frequency will be extended to one gallon sample per every 500 tons.

Specification Limits

Because the representative sample tested by the lab indicated belt wire did not impact the liner, there will be no limitation on the TDA with belt wire. The representative sample shall have no more than 5% of TDA with bead wire exceeding ½ inch in length from the edge of the rubber.



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

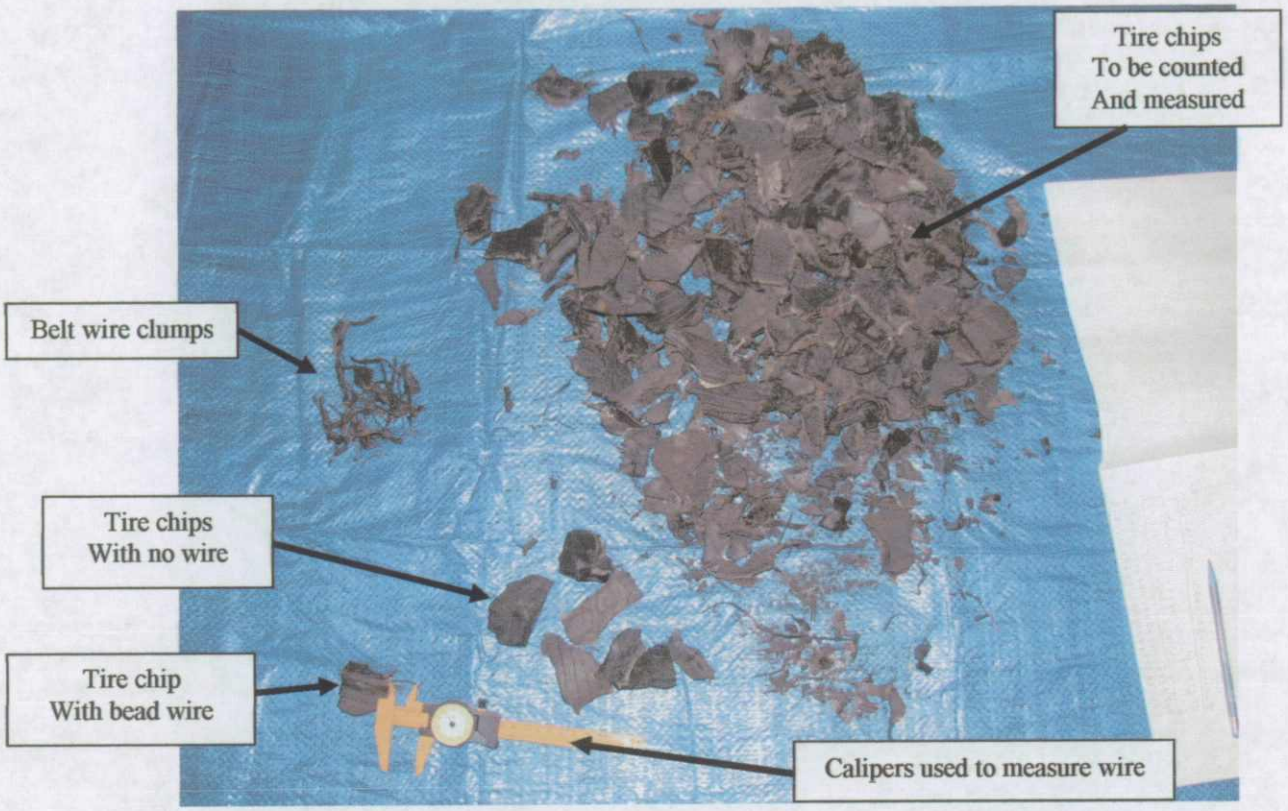
5/24/11

DOUGLAS J. LUZBETAK, P.E. DATE
License number 12654

My license renewal date is December 31, 2012.

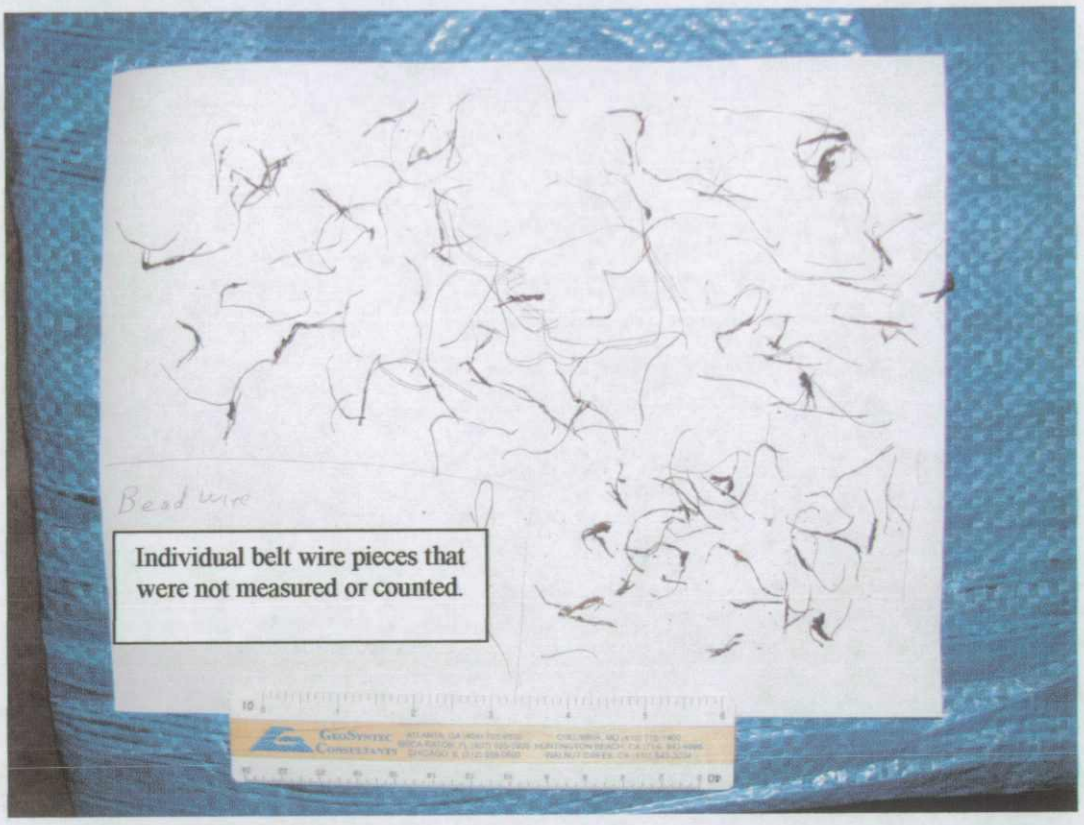
Pages or sheets covered by this seal:
All

South Dallas County Landfill TDA Photos 2011



South Dallas County Landfill TDA Photos 2011

South Dallas County Landfill TDA Photos 2011



SOUTH DALLAS COUNTY LANDFILL

TIRE DERIVED AGGREGATE
FIELD REPORT

LOADS RECEIVED

Load number	Date	Weight Tons	Visual Observatons	Passed Visual Spec Yes/No
TOTALS				

Sample Data

Taken from load number	
Date	

Comments

Sample Results

Total Pieces	
Bead Wire > 1/2"	

Percentage of Bead Wire [Spec limit < 5% of Total]		Met Spec [Yes/No]	

Resident Project Representative **Date**

May 10 - 4:00p - 5:30
May 11 - 10:00A - 2:30 (Lunch 1h-) } county treasury
May 11 2:30 - 4:30 - calculations

- 0
- .8
- .6
- 0
- 0
- 0
- .55
- 0
- 0
- .1
- 1.15
- .5
- 1.5
- 1.1
- 1.0
- .4
- 0
- 3.4
- .9
- .9
- .9
- 0
- 1.0
- 0
- 0
- 0
- .9
- 0
- 0

31 - .9
32 - 1.0
33 - 1.5
34 - 0
35 - .7
36 - .7
37 - .9
38 - .4
39 - 0
40 - 1.9
41 - .8
42 - 0
43 - 0
44 - .5
45 - .8
46 - 3.0
47 - .65 B
48 - 0
49 - 0
50 0
51 - .6
52 - .6
53 - 1.1
54 - 1.9
55 - 1.3
56 - 0
57 - 0
58 - .8
59 - 0
60 .4

61 - 0
62 - 0
63 - 0
64 - .5
65 - .8
66 - 0
67 - 0
68 - 0
69 - 0
70 - .6
71 - .9
72 - 0
73 - 1.0
74 - 0
75 - 1.0
76 - 0
77 - .5
78 - 0
79 - 1.1
80 - 1.3
81 - 0
82 - 0
83 - 0
84 - .6
85 - .4
86 - 0
87 - .7
88 - 1.5
89 - 0
90 - 3.0

91 - .7
92 - .3
93 - 0
94 - .6
95 - 0
96 - .4
97 - 1.2
98 - .8
99 - .4
100 - 1.5
1 - 1.6
2 - .5
3 - 0
4 - 0
5 - 0
6 - 0
7 - .4
8 - 0
9 - 0
10 - 0
11 - 0
12 1.6
13 - 1.5
14 .3
15 - 0
16 - 0
17 - 1
18 - 0
19 - 0
120 0

121 - 1.0
22 - .7
23 - 0
24 - .4
25 - .4 B
26 - 1.1
27 - 0
28 - .9
29 - .263
30 - 1.7
31 - 0
32 - .5
33 - 1.1
34 - 1.2
35 - .7
36 - 0
37 - 0
38 - 0
39 - 0
40 - .9
41 - .5
42 - 1.4
43 - 0
44 - 0
45 - 1.0
46 - 1.2
47 - 0
48 - .9
49 - .4
150 - 0

151 - 1.1
52 .3
53 - 0
54 - .6
55 - 0
56 - .28
57 - 1.0
58 - .5
59 - 0
60 - .7
61 - .7
62 - .6
63 - 1.0
64 - 1.0
65 - 1.3
66 - 1.6
67 - .8
68 - .8
69 .6
70 - 0
71 - 0
72 - 0
73 - .7
74 - .9
75 - 1.1
76 - .7
77 - 0
78 - 1.2
79 - 1.4
180 - 1.8

181 - 1.1
82 - 1.0
83 - .9
84 - .3B
85 - .3
86 - .7
87 - .5
88 - 0
89 - 0
90 - 0
91 - 0
92 - 0
93 - 0
94 - 1.4
95 - .6
96 - 0
97 - .2
98 - 1.5
99 - 1.0
200 - 0
201 - .1
2 - 0
3 - 0
4 - .5
5 - 0
6 - 1.3
7 - 1.7
8 - .6
9 - 0
210 - 0

11 - 0	41 - 0	71 - 0	301 - .7	331 - 0	361 - .1	391 - 0
12 - 0	42 - 0	72 - 0	2 - .1	32 - .8	62 - 0	92 - .2
13 1.2	43 .7	73 - 0	3 - .5	33 - 0	63 - 0	93 - 1.0
14 0	44 2.3	74 - 2.0	4 - 0	34 - 0	64 - .7	94 - 0
15 1.9	45 1.0	75 - .5	5 - .2	35 - 0	65 - 1.3	95 - .8
16 0	46 1.5	76 - 0	6 - 0	36 - 0	66 - 1.4	96 - 0
17 1.5 B	47 0	77 - .7	7 - 0	37 - 0	67 - .8	97 - 0
18 0	48 0	78 - 0	8 - 0	38 - 1.1	68 - 1.0	98 - 0
19 1.1	49 1.5	79 - 0	9 - 0	39 - 0	69 - .7 B	99 - 0
20 0	50 1.2	80 - 0	10 - 0	40 - 0	70 - 0	400 - 0
21 1.1	51 0	81 - .1	11 - 0	41 - .7	71 .1 B	1 - 0
22 0	52 1.3	82 - 0	12 - 0	42 - .3	72 - .9	2 - .8
23 0	53 0	83 - 0	13 - 0	43 - 0	73 - .6	3 - 0
24 1.4	54 0	84 - 0	14 - 0	44 - 1.1	74 - 1.5	4 - 0
25 0	55 .4	85 1.5	15 - 0	45 - 0	75 - 0	5 - .8
26 .4	56 0	86 - 0	16 - 0	46 - .9	76 - .6	6 - 0
27 0	57 0	87 .3 B	17 - 0	47 1.2	77 - .4	7 - 0
28 0	58 .3	88 - .7	18 - 0	48 - .3	78 - 0	8 - 0
29 0	59 .2	89 - 0	19 - 0	49 - 0	79 - 0	9 - 0
30 .1	60 .7	90 - 0	20 - 1.3	50 - 0	80 - .4	10 - .2
31 0	61 .4	91 - 1.3	21 - 0	51 - 0	81 - .8	11 - 0
32 0	62 0	92 - 0	22 - 0	52 - 0	82 - 1.3	12 - .6
33 0	63 0	93 - .5	23 - 0	53 - .5	83 - 0	13 - .7
34 .6	64 1.4	94 - 0	24 - 0	54 - 0	84 - .1 B	14 - 0
35 0	65 0	95 - 0	25 - .6	55 .9	85 - 0	15 - 0
36 0	66 0	96 - 1.2	26 - 1.6	56 - 0	86 - .7	16 - 2.0
37 0	67 .8	97 - 0	27 - 0	57 - 1.4	87 - 0	17 - 0
38 - 0	68 .8	98 - 0	28 - .7	58 - 0	88 - 1.7	18 - 0
39 - 1.3	69 0	99 - .3	29 - .7	59 - 0	89 - 0	19 - 0
40 - 0	280	300 - 0	330 - 0	360 - 0	390 - 1.0	420 - 0

1 -0
2 -0
3 -0
4 -0
5 -0
6 -1.7
7 -0
8 -.8
9 -.6
10 -0
11 -0
12 -0
13 -0
14 -0
15 -0
16 -1.0
17 -0
18 -1.3
19 -0
20 -.3
21 -0
22 -1.3
23 -0
24 -2.0
25 -0
26 -0
27 -0
28 -.4B
29 -0
30 -0

451 -0
52 -.6
53 -0
54 -.8B
55 -.9
56 -0
57 -0
58 -.8
59 -0
60 -.4
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62 -0
63 -0
64 -0
65 -0
66 -0
67 -0
68 -1.3
69 -0
70 -0
71 -1.7
72 -0
73 -.2B
74 -0
75 -0
76 -.8
77 -.3
78 -.5
79 -0
480 -0

481 -0
82 -0
83 -.3
84 -.9B
85 -0
86 -0
87 -0
88 -0
89 -0
90 -0
91 -0
92 -.6
93 1.7
94 -0
95 -0
96 -.8
97 -0
98 -0
99 -0
500 -0
1 -.5
2 -.9
3 -0
4 -.1B
5 -0
6 -.5
7 -0
8 -0
9 -.6
510 -0

511 -1.2
12 -0
13 -0
14 -.3B
15 -.7
16 -.5
17 -.6
18 -0
19 -.2
20 -0
21 -0
22 -.3
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30 -2.0
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37 -0
38 -1.6
39 -.8
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44 -.9
45 -0
46 -0
47 -0
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50 -.5
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53 -.5
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55 -0
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60 -0
61 -0
62 -.3
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64 -0
65 -0
66 -1.7
67 -0
68 -0
69 -0
570 -0

571 -1.0
72 -0
73 -0
74 -0
75 -0
76 -1.0
77 -.8
78 -1.0
79 -0
80 -.6
81 -1.2
82 -2.2
83 -0
84 -0
85 -.4
86 -.3
87 -1.4
88 -0
89 -.8
90 -0
91 -0
92 -.4
93 -0
94 -0
95 -.4
96 -0
97 -.5
98 -0
99 -0
600 -0

601 -0
2 -0
3 -0
4 -0
5 -0
6 -0
7 -2.0
8 -1.0
9 -1.0
10 -0
11 -0
12 -1.7
13 -0
14 -.7
15 -0
16 -1.2
17 -.9
18 -1.4
19 -0
20 -0
21 -.6
22 -.3
23 -0
24 -.8
25 -.4
26 -.4
27 -.8
28 -.7
29 -1.2
630 .9

misc individual wire 0.2 oz
50 – small chunks – 1.4 oz
crums – 2.5 g

– 0	661 – 1.4	691 – 0
– 0	62 – 18	92 – 0
– 0	63 – 0	93 – 0
– .2	64 – 0	94 – 0
– .5	65 – .9	95 – 0
– 0	66 – 0	96 – 0
.5	67 – 1.0	97 – 0
0	68 – 1.4	98 – 0
– .6	69 – 1.1	99 – 0
0 – .7	70 – 0	700 – 0
1 – .9	71 – 0	1 – .18
2 – 1.8	72 – 0	2 – .4
3 – 0	73 – 0	3 – 0.
44 – .5	74 – .18	4 – .7
45 – 0	75 – 0	5 – 0
46 – 0	76 – 0	6 – 0
47 – 0	77 – 0	7 – 0
48 – 0	78 – 0	8 – 0
49 – 1.4	79 – 0	9 – 0
50 – 0	80 – 0	10 – 0
51 – 0	81 – 0	11 0
52 – 0	82 – 0	12 0
53 – .7	83 – .3	13 0
54 – .7	84 – 0	14 0
55 – 0	85 – .7	15 0
56 – 0	86 – .9	16 0
57 – .7	87 0	17 – 0
58 – 1.0	88 – 0	18 – 0
59 – .8	89 – 0	19 – 0
60 – 1.1	690 – 0	720 – 0 (27)

721 – 1.0
22 .9
23 .2
24 .3
25
26

Misc Bore Wire

Bead wire	
2.9	0.9
2.1	0.8
2.0	(19) 0.6
1.3	
1.1	
1.4	

Belt
Tread wire Clumps – 1.0 oz

1	3.4	3.5	1.2
2	2.8	1.6	1.6
3	2.4	2.4	2.3
4	2.6	2.6	1.5
5	2.6	0.9	1.8
6	3.0	2.1	1.7
7	2.1	2.3	2.0
8	4.1	2.0	1.8
9	2.4	1.5	1.3
10	1.9	1.3	1.5
11	2.0	2.1	1.7
12	2.0	2.9	1.4
13	2.1	1.9	1.0
14	1.9	1.4	1.1
15	1.9	1.4	1.1
16	2.8	1.2	0.6
17	2.8	1.2	1.3
18	2.2	1.9	1.7
19	3.0	1.4	2.2
20	2.0	1.8	1.0
21	2.1	1.6	1.8
22	3.0	1.7	1.6
23	1.5	0.8	0.9
24	1.7	1.0	0.8
25	1.5	1.1	0.9
26	0.9	0.9	1.2
27	0.7	1.0	0.6
28	1.3	0.7	
29	0.9	(85) 0.8	
30			

Pieces w/ Beadwire

.1 =	5	
.2 -	2	
.3 -	3	
.4 -	2	
.5 -	2	
.6 -	—	
.7 -	1	
.8 -	1	
.9 -	1	
1.0 -		
Total	17	

707

0 = 40 45 50 45/180

2.1 -
2.2 - 1 1
2.3 - 2
2.4 -
2.5 -
2.6 - (6) 1.8
2.7 -
2.8 -
2.9 -
3.0 - 2
3.4 - 1 1

1 -	6			
2 -	9	(89)	11.9	
3 -	18			
4 -	25			
5 -	26			
6 -	25			
7 -	31			
8 -	27	(137)	19.4	
9 -	26			
1.0 -	28			
.1 -	16			
.2 -	11			
.3 -	12	(62)	8.8	
.4 -	14			
.5 -	9			
.6 -	5			
.7 -	9			
.8 -	2	(23)	3.3	
.9 -	—			
1.0 -	7			

312

2 = 75 75 38 727 215

(395) 55.8%

Wire Clamps

.1 -			
.2 -			
.3 -			
.4 -			
.5 -			
.6 - II	2		
.7 - II	2		
.8 - III	3	(17)	20.10
.9 - IIII I	6		
1.0 - IIII	4		
1.1 - III	3		
1.2 - IIII	4		
1.3 - IIII	4	(20)	23.5
1.4 - IIII	4		
1.5 - IIII	5		
1.6 - IIII	4		
1.7 - IIII	5	(23)	27.6
1.8 - IIII	4		
1.9 - IIII	5		
2.0 - IIII	5		
2.1 - IIII	5		
2.2 - II	2		
2.3 - II	2	(12)	14.1
2.4 - III	3		
2.5			
2.6 - III	3		
2.7			
2.8 - III	3	10	11.8
2.9 - I	1		
3.0 - III	3		

.4 - I	(3)	3.5
.5 - I		

1.1 - I

818 total pieces in bucket

Break down of percentages

Total # 724 tire chip pieces in 5 gal bucket

Tire Chips w/ belt wire 707#

0 - .5"	68%
.5" - 1.5"	28%
1.5" - 3/4	4%

Wire clamps Belt wire 85 pieces

0 - .5"	0%
.5" - 1.5"	44%
1.5" - 3"	53%
3" - 4.1"	3%

Tire Chips with Bead wire

17 Total pieces / 2.3% of total Tire Chips

(7 pieces) 0 - .2" -	41%
(7 pieces) .2" - 1.5" -	41%
(3 pieces) .5" - 1.0" -	18%

of Tire chips with Bead wire

Individual pieces of Bead wire w/o tire attached
9 - pieces total

.6" to 2.9" in size

(3 pieces) 0 - 1"	33.3%
(3 pieces) 1" - 2"	33.3%
(3 pieces) 2" - 3"	33.3%